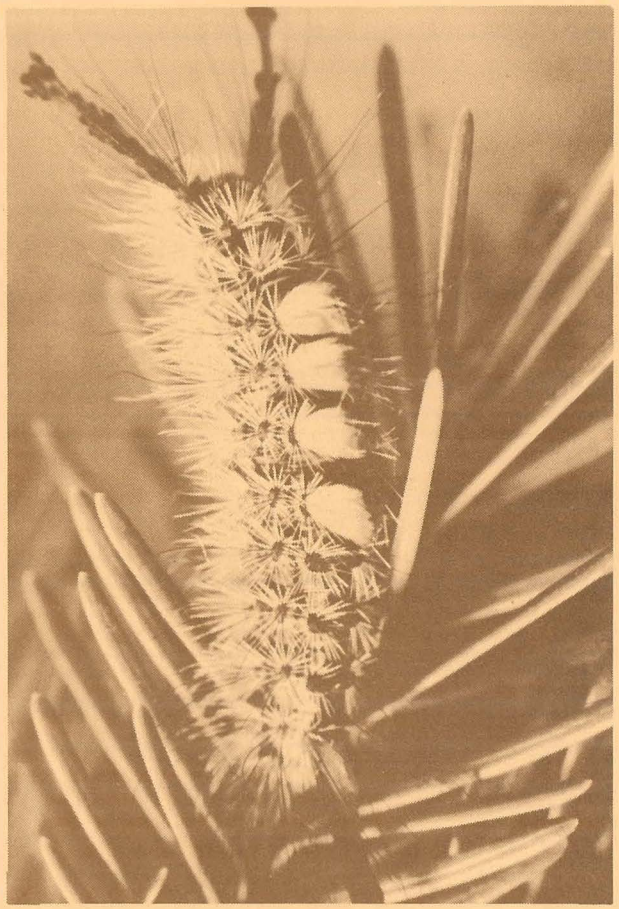
A DOUGLAS-FIR TUSSOCK MOTH
LOSS ASSESSMENT
EVALUATION
1980



SOUTHWESTERN REGION

DEPARTMENT OF AGRICULTURE • FOREST SERVICE

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A DOUGLAS-FIR TUSSOCK MOTH LOSS ASSESSMENT EVALUATION

Region 3

by

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ABSTRACT

Nine Douglas-fir tussock moth (DFTM), Orgyia pseudotsugata (McD.), infestations occurred in northern New Mexico from 1975-1979. In 1979, DFTM evaluations were conducted in four of the nine canyons where infestations occurred in Douglas-fir, Pseudotsuga menziesii var. glauca (Beissen.) Franco, and true fir, Abies spp., stands. The results of these evaluations show that the DFTM is capable of causing severe tree losses, particularly in those stands where host trees make up the majority of the tree resource. Tree mortality in stands evaluated ranged from 28 to 97 percent. Top-kill recorded in three of the four stands resulted in damages of 11, 14, and 8 percent. No top-killing of trees was recorded in one stand because almost all of the host trees were killed. Host tree mortality and top-kill to the pole- and sawtimber-size trees ranged between 8 and 31 percent, while losses to regeneration-size trees ranged between 28 and 66 percent.

INTRODUCTION

Douglas-fir tussock moth outbreaks occurred in nine isolated canyons (Fig. 1, Appendix) in northern New Mexico from 1975-1979, and caused severe and widespread losses to Douglas-fir and true fir stands. Outbreak levels of the tussock moth were first observed on the Cibola National Forest in 1976. Within 2 years, eight additional tussock moth infestation centers were detected. The duration, extent, and level of tree losses and damage could not be predicted because there were no records on previous infestations in similar areas.

In the fall of 1979, DFTM damage evaluations were made in four of the nine canyons where infestations occurred in the Douglas-fir and true fir host type. Areas evaluated included Bear Canyon, Elena Gallegos Grant; Medio Dia Canyon, Santa Fe National Forest; and Los Alamos and Pueblo Canyons, Los Alamos County. Damage data collected from these canyons are presented in this report.

OBJECTIVES

The objectives of this evaluation were:

1. Document the location, extent, and duration of the recent infestations.

2. Estimate tree mortality and top-kill in pole- and sawtimber-size Douglas-fir and true fir.

3. Estimate mortality and top-kill to regeneration-size host trees (trees less than 5 inches in diameter).

DESCRIPTIONS OF INFESTATIONS

Cibola National Forest and Adjacent Private Land

Bear Canyon. This outbreak occurred about 5 miles northeast of the city of Albuquerque, on private land within the boundaries of the Elena Gallegos Grant, on the west side of the Sandia Mountains. This canyon is situated west to east, terminating at the base of the mountain crest, with infestation elevations ranging from 7,000 to 8,000 feet (Figs. 2-4, Appendix). DFTM activity was first observed in this area in 1978 on approximately 600 acres of host type, 240 acres of which were heavily defoliated. In June 1979, 600 acres within the infestation boundary were aerially treated with the Douglas-fir tussock moth nucleopolyhedrosis virus. The treatment project was a cooperative effort among New Mexico Department of Natural Resources, Division of Forestry; New Mexico Department of Agriculture, Division of Plant Industry; the Albuquerque Academy; and the Forest Service. Population levels and subsequent defoliation were reduced to extremely low levels by the treatment.

Cañon de Dominga Baca. This infestation was located about 4 miles north of Bear Canyon on the west side of the Sandia Mountains, directly below the aerial tramway. The canyon is situated west to east, terminating at the base of the mountain crest, with infestation elevations ranging from

7,000 to 8,000 feet. Defoliation in this canyon was first observed in 1977 and consisted of two infestation centers (Fig. 5, Appendix). Defoliation was heavy in both areas. In 1978, the area of defoliation increased to and spread onto the Elena Gallegos Grant. A total of 46 acres was defoliated. The infestation collapsed in 1979.

Cañon del Agua. This infestation was located about 6 miles north of Cañon de Dominga Baca, on the west side of the Sandia Mountains. The canyon is situated west to east, terminating at the base of the mountain crest with infestation elevations ranging from 7,200 to 9,100 feet (Fig. 6, Appendix). Moderate to heavy defoliation was first observed in this canyon in 1976. Defoliation by this insect decreased naturally in 1977, but then increased again in 1978. Continued defoliation in 1978 caused severe tree losses on about 70 acres. Defoliation decreased to undetectable levels in 1979.

Cañon del Trigo. This outbreak was located about 25 miles southeast of the city of Albuquerque, on the west side of the Manzano Mountains (Fig. 7, Appendix). The canyon is situated west to east, terminating at the mountain crest, with infestation elevations ranging from 6,500 to 7,600 feet. Defoliation has occurred in this canyon since 1976, and has resulted in complete tree mortality along the canyon floor and heavy mortality on adjacent slopes. Defoliation to the remaining host type at the head of the canyon continued in 1979, but at a low level. Mortality extended over about 52 acres.

Santa Fe National Forest and Adjoining Land of Mixed Ownership

Medio Dia Canyon. This outbreak was located about 25 miles west of the city of Santa Fe. The canyon is situated southeast to northwest, with elevations ranging from 6,500 to 7,500 feet (Fig. 8, Appendix). Defoliation occurred for 4 years, and caused heavy mortality and top-kill to host type over about 125 acres of the canyon floor and lower and upper adjacent slopes. Infestations collapsed in 1978.

Cochiti Canyon. This infestation center was located about 2 miles north of Medio Dia Canyon (Fig. 8, Appendix). The canyon is situated south to north, with infestation elevations ranging from 6,500 to 7,100 feet. The infestation started in 1977. DFTM population densities and subsequent defoliation increased in 1978 causing widespread tree mortality and top-kill to approximately 14 acres of susceptible host type. In 1979, defoliation had decreased to an undetectable level.

Nambe Canyon. This outbreak was located 20 miles north of the city of Santa Fe, on the boundary of the Nambe Indian Reservation and the Santa Fe National Forest (Fig. 9, Appendix). The canyon is situated west to east with infestation elevations ranging from 6,500 to 7,400 feet. Heavy defoliation was first observed in this canyon on the Reservation in 1977. In 1978, the infestation spread onto the Pecos Wilderness, Santa Fe National Forest. Tree mortality was concentrated over about 22 acres of the canyon floor and lower adjacent slopes. Aerial and ground surveys in 1979 revealed no additional defoliation.

Los Alamos and Pueblo Canyons. These infestation centers were located within the townsite of Los Alamos and nearby lands in Los Alamos County, and includes Federal lands managed by the Department of Energy and the Santa Fe National Forest. These canyons are situated east to west. Noticeable defoliation occurred in Los Alamos and Pueblo Canyons in 1976, and by 1979, moderate to complete defoliation occurred on 600 acres of the mixed conifer type in these canyons (Figs. 10 and 11, Appendix). In 1978, a pilot project was conducted to test the efficacy of the DFTM nucleopolyhedrosis virus. As a result of this test, population levels and defoliation in these canyons were reduced to extremely low levels. In 1979, no additional tussock moth defoliation occurred.

METHODS

Aerial Phase

Canyons evaluated were sketch-mapped from the air to delineate acreages of DFTM mortality. Aerial sketch maps (Figs. 2 and 5-10, Appendix) were then used to determine approximate acreages of overall mortality and top-kill for each canyon, and to locate the ground survey plots.

Ground Phase

Fifteen to 20 variable plots were sampled in four canyons: Los Alamos, 15; Pueblo, 20; Medio Dia, 20; and Bear, 18. Sample plots were established at 2-chain intervals along cruise lines, 2 chains apart. Plot establishment was based on two criteria: (1) that all plots sampled be located in the specified mortality boundaries, and (2) plots be established in areas with existing host type.

The variable plot sampling method, using a 20 basal area factor, was used to estimate the number of pole- and sawtimber-size, dominant-codominant trees. Pole- and sawtimber-size trees (trees greater than or equal to 5 inches in d.b.h.) were tallied by species, d.b.h., and condition class (live, dead, top-killed). Host and nonhost trees were measured to the nearest 0.1 inch.

Fixed sample plots (1/100-acre) were superimposed on all variable plots to estimate the loss of understory trees. All host and nonhost trees 0.4 inches to 4.9 inches in d.b.h. were tallied by species, d.b.h., and condition class (live, dead, top-killed). Both host and nonhost trees were measured to the nearest 0.1 inch.

Stand summary tables and statistical analyses were generated using a computer program.[1/]

1/ Acciavatti, R. E., and B. W. Geils. 1977. A user's guide to "PEST": A computer program for summarizing forest insect and disease damage surveys. Tech. Rep. R3-77-16.

RESULTS AND DISCUSSION

Douglas-fir and true fir stands were heavily depleted of host type in all DFTM infestation sites surveyed. In stands surveyed, tree mortality, excluding nonhost species, ranged from 28 to 97 percent, and top-kill 8 to 14 percent. Estimated tree losses of host species occurring to the pole- and sawtimber-size trees (trees greater than or equal to 5 inches in d.b.h.) ranged from 8 to 31 percent in the four stands evaluated, while mortality and top-kill to understory regeneration-size trees were somewhat heavier and ranged from 28 to 66 percent. Acres of host type killed were concentrated, and located in isolated pockets totaling 405 acres throughout the four canyons surveyed: 130 acres in Bear; 125 acres in Medio Dia; 50 in Los Alamos; 100 in Pueblo. These data are presented in the Appendix by canyon, species, d.b.h., and condition class, and summarized below along with a brief discussion of each infestation site surveyed.

Bear Canyon

An estimated 99 percent of the host type within the area surveyed was killed by the DFTM in this canyon. Losses to host species averaged 434 trees per acre and amounted to 97 percent of all the tree species. Losses to the sapling and pole and sawtimber component were extensive and averaged 66 and 31 percent, respectively. A summary follows.

Stand Data	Sapling-size trees (less than 5 inches d.b.h.)	Pole- & sawtimber-size trees (greater than or equal to 5 inches d.b.h.)	Total
Total trees/acre	305	143	448
Live trees/acre	11	2	13
Dead trees/acre	294	140	434
Top-killed trees/acre	---	---	---
Percent stand live (undamaged)	2	1	3
Percent stand dead	66	31	97
Percent stand top-killed	---	---	---

Medio Dia Canyon

Host tree damages in this canyon averaged 259 trees killed and 62 trees top-killed per acre in all areas surveyed. Total tree densities were reduced from 596 to 337 trees per acre (44 percent). Regeneration-size trees and the pole and sawtimber component sustained 41 and 14 percent of the damages, respectively. A summary follows.

Stand Data	Sapling-size trees (less than 5 inches d.b.h.)	Pole- & sawtimber-size trees (greater than or equal to 5 inches d.b.h.)	Total
Total trees/acre	449	147	596
Live trees/acre	168	100	268
Dead trees/acre	200	59	259
Top-killed trees/acre	40	22	62
Percent stand live (undamaged)	36	9	45
Percent stand dead	34	10	44
Percent stand top-killed	7	4	11

Los Alamos Canyon

Damages to Douglas-fir and true fir host type were heaviest in and around the townsite of Los Alamos, Los Alamos County. Mortality and top-kill in this infestation site averaged 605 and 150 trees per acre, respectively. Total tree densities in the areas surveyed were reduced from 1,068 to 463 trees per acre, or by 57 percent. Fifty-six percent of the damages occurred to sapling-size trees and 15 percent to the pole and sawtimber component. These data are summarized below.

Stand Data	Sapling-size trees (less than 5 inches d.b.h.)	Pole- & sawtimber-size trees (greater than or equal to 5 inches d.b.h.)	Total
Total trees/acre	840	228	1,068
Live trees/acre	247	66	313
Dead trees/acre	480	125	605
Top-killed trees/acre	113	37	150
Percent stand live (undamaged)	23	6	29
Percent stand dead	45	12	57
Percent stand top-killed	11	3	14

Pueblo Canyon

The Pueblo Canyon DFTM infestation, also located within the townsite of Los Alamos, Los Alamos County, sustained the least amount of damages of all the areas surveyed. This may have been because 57 percent of the tree species consisted of ponderosa pine (Pinus ponderosa Laws.). Host tree mortality and top-kill in the areas surveyed averaged 171 and 45 trees, respectively. Twenty-eight percent of the stand damages occurred to regeneration-size trees and 8 percent to pole- and sawtimber-size trees. These data are summarized below.

Stand Data	Sapling-size trees (less than 5 inches d.b.h.)	Pole- & sawtimber-size trees (greater than or equal to 5 inches d.b.h.)	Total
Total trees/acre	470	138	608
Live trees/acre	300	92	392
Dead trees/acre	125	46	171
Top-killed trees/acre	45	--	45
Percent stand live (undamaged)	49	15	64
Percent stand dead	20	8	28
Percent stand top-killed	8	--	8

APPENDIX

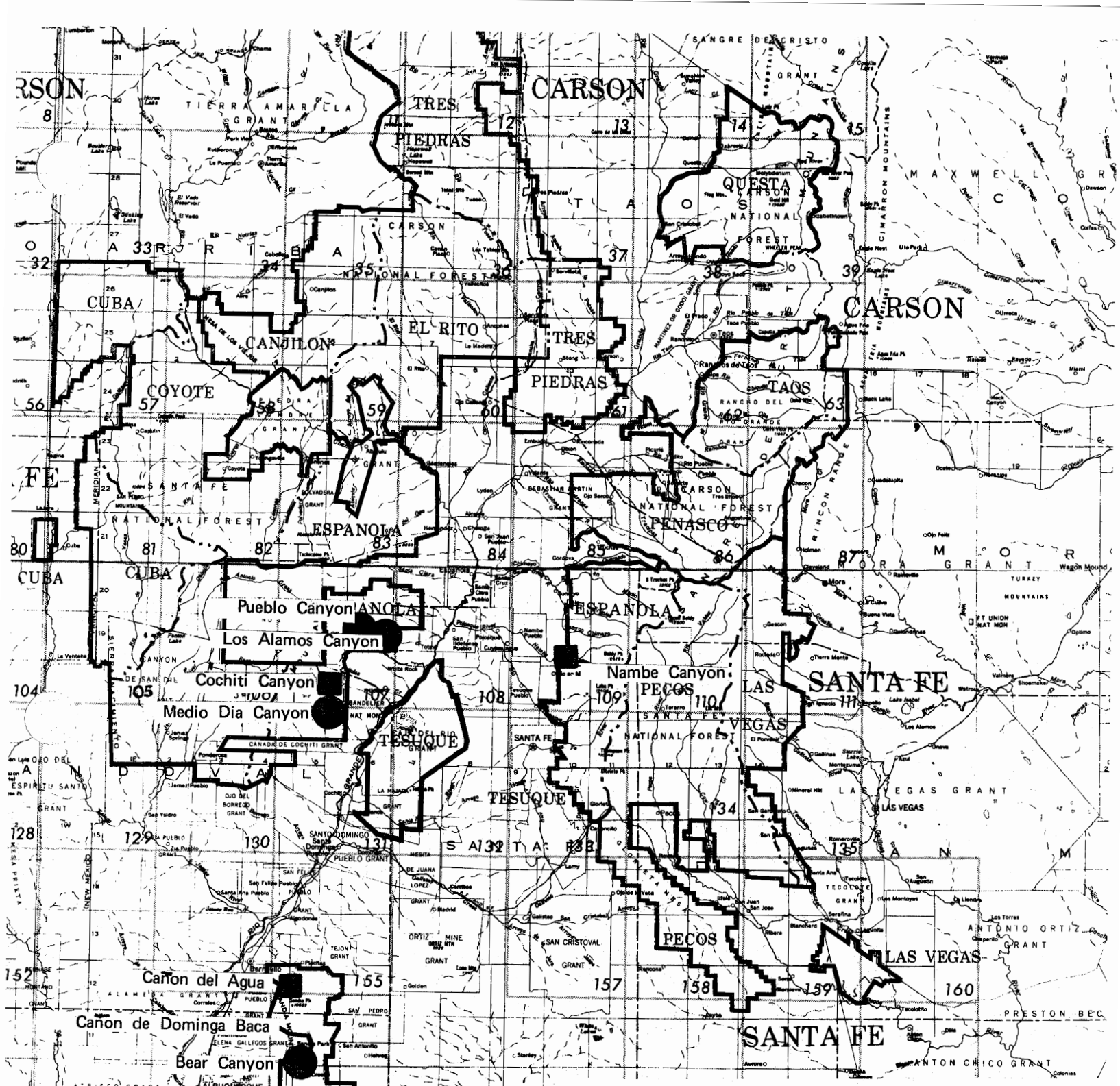

Figure 1.--Location of DFTM infestations in New Mexico (1976-1979).

● Areas evaluated.

■ Areas not evaluated.

For more detail, see Figures 2 and 5 through 10.

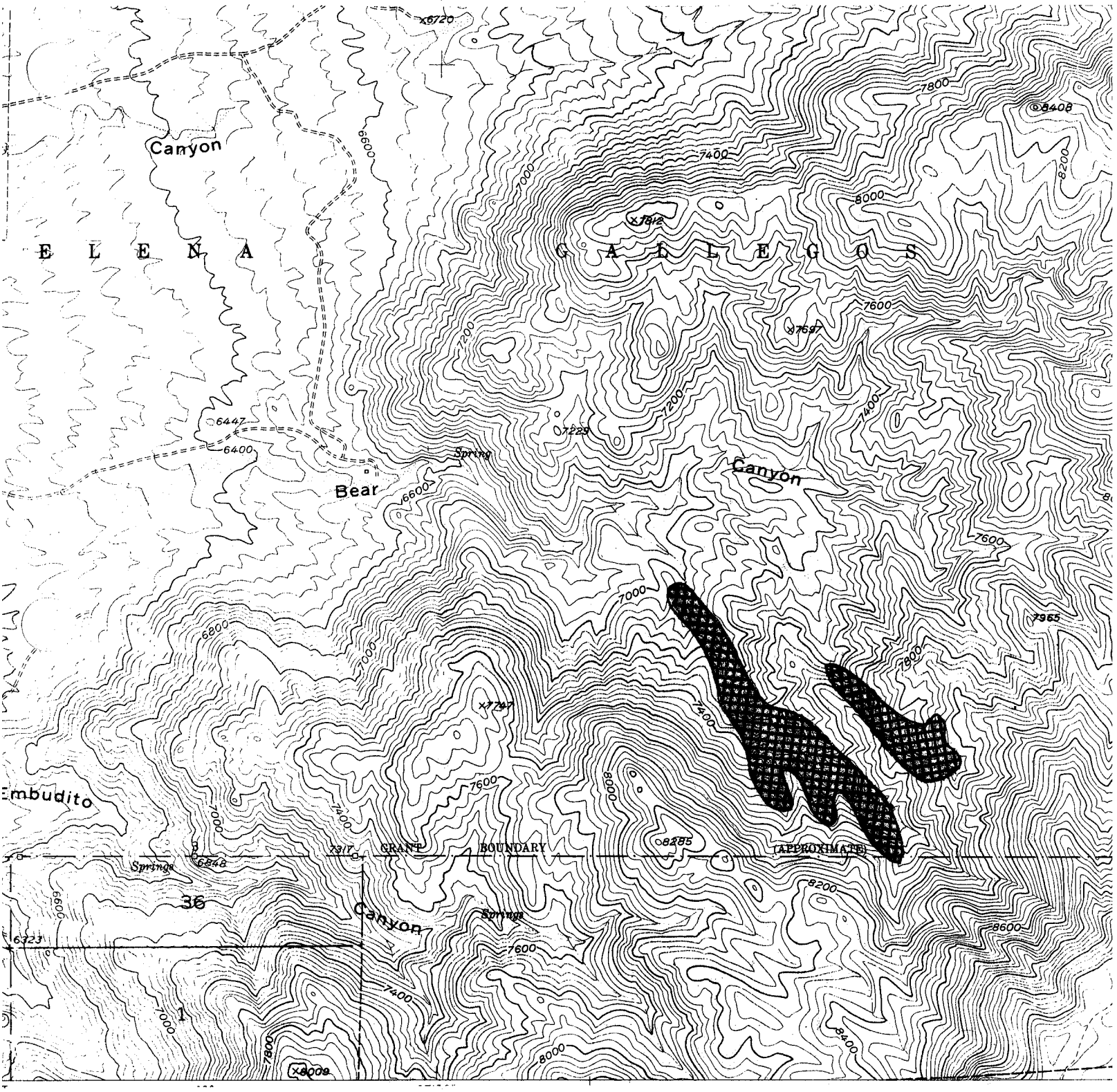

Figure 2.--Douglas-fir tussock moth infestation area, 1979. Bear Canyon, Elena Gallegos Grant.

Scale: 1:24000, 2-3/8 inches to the mile.

Figure 3.--Mortality resulting from DFTM defoliation in 1978 and 1979, Bear Canyon, Elena Gallegos Grant.

Figure 4.--Douglas-fir and true fir mortality in Bear Canyon, Elena Gallegos Grant, 1979.

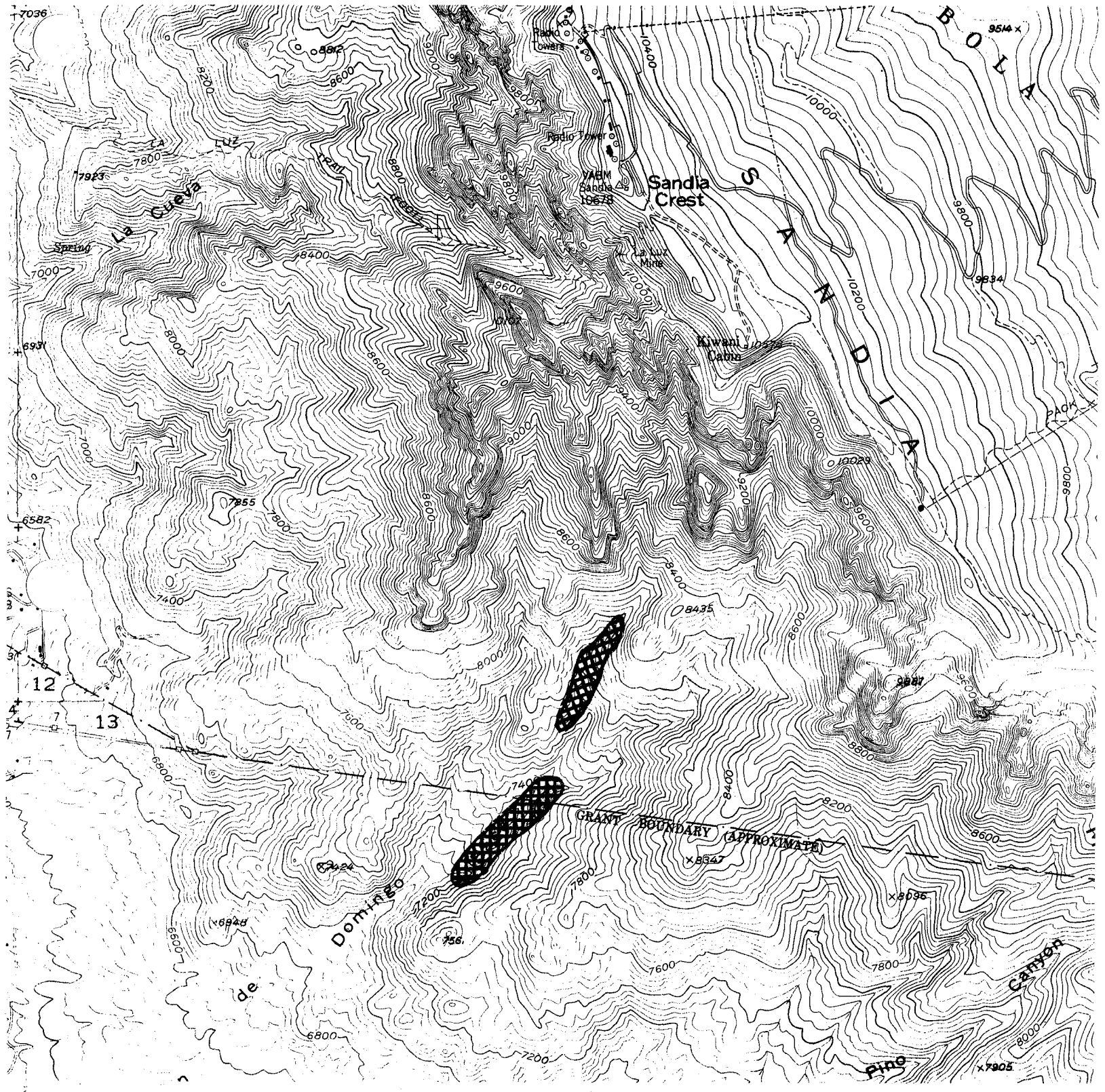

Figure 5.--Douglas-fir tussock moth infestation area, Cañon de Dominga Baca, Sandia Ranger District, Cibola National Forest.

Scale: 1:24000, 2-3/8 inches to the mile.

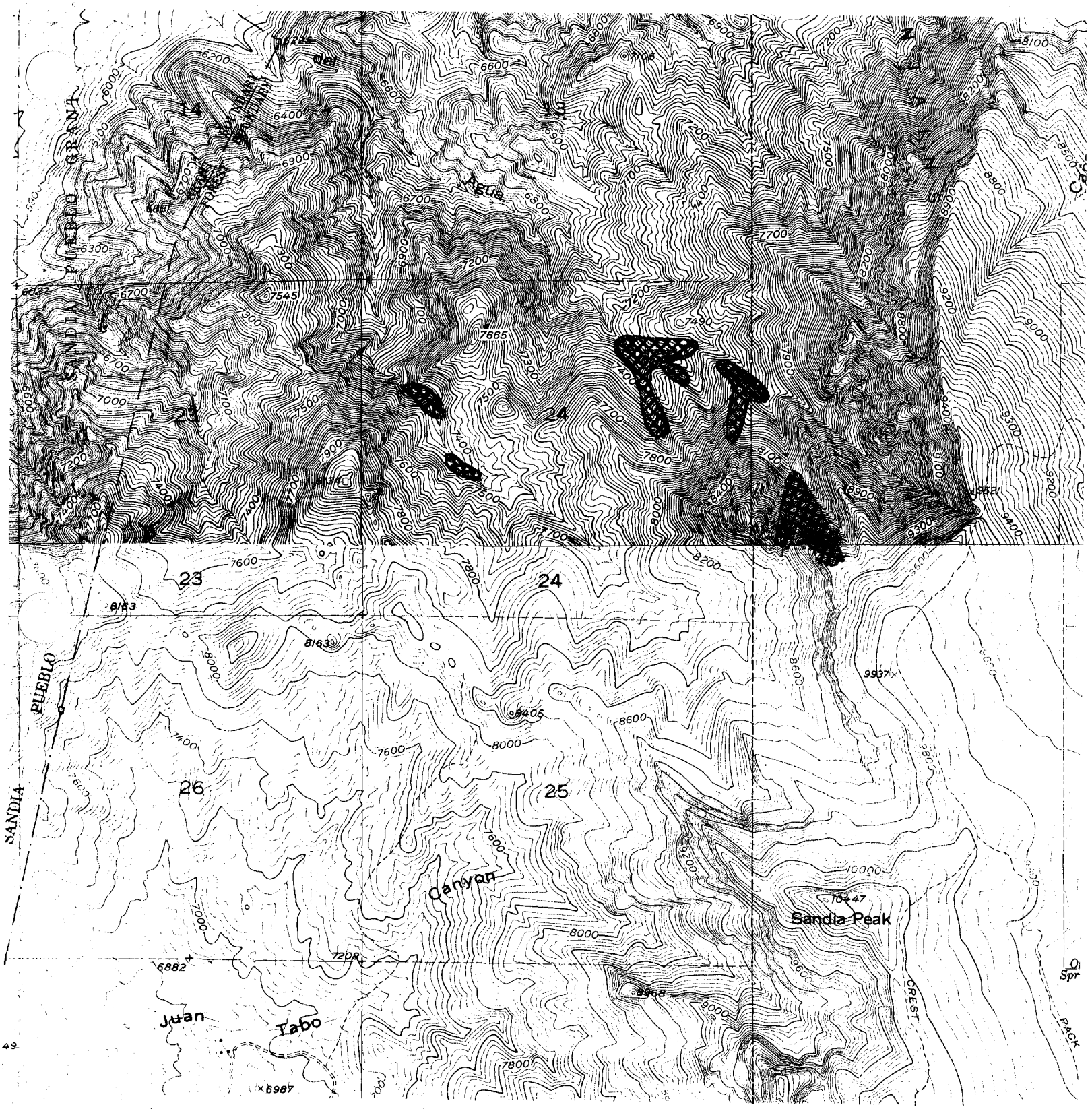

Figure 6.--Cañon del Agua infestation area, Sandia Ranger District, Cibola National Forest.

Scale: 1:24000, 2-3/8 inches to the mile.

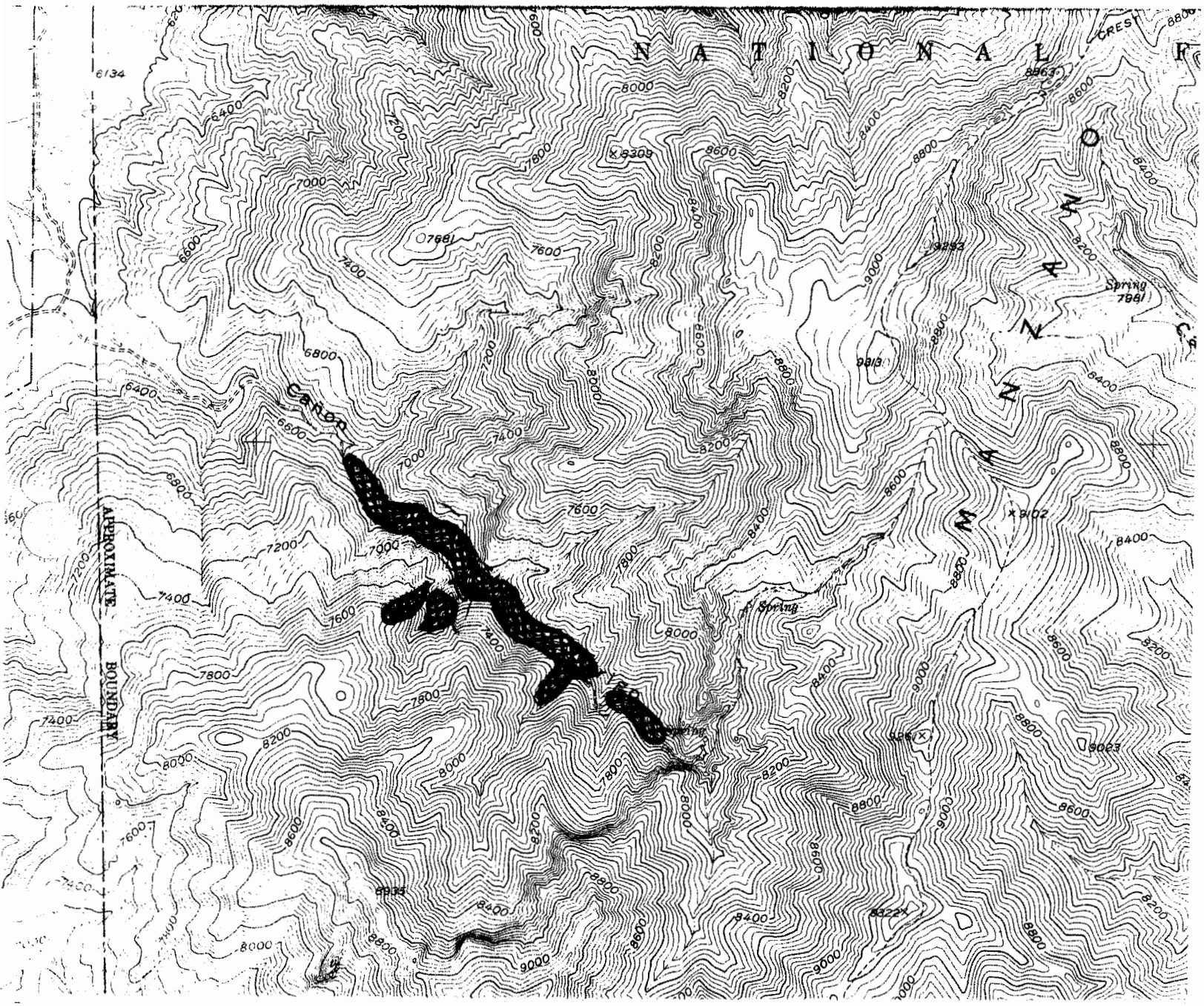

Figure 7.--Douglas-fir tussock moth infestation area, 1979. Cañon del Trigo, Mountainair Ranger District, Cibola National Forest.

Scale: 1:24000, 2-3/8 inches to the mile.

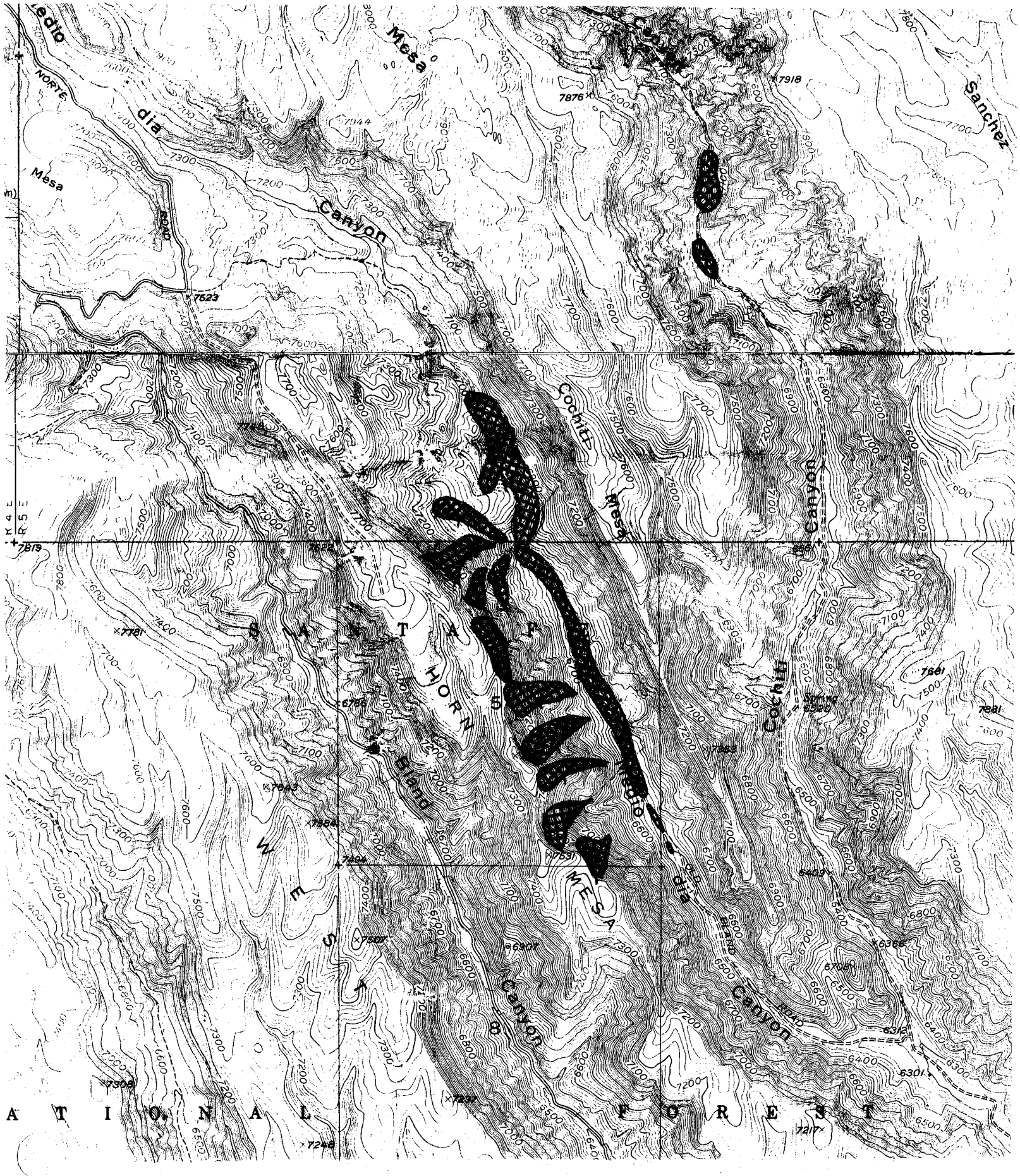

Figure 8.--Douglas-fir tussock moth infestation area, 1979. Medio Dia and Cochiti Canyons, Tesuque Ranger District, Santa Fe National Forest.

Scale: 1:24000, 2-3/8 inches to the mile.

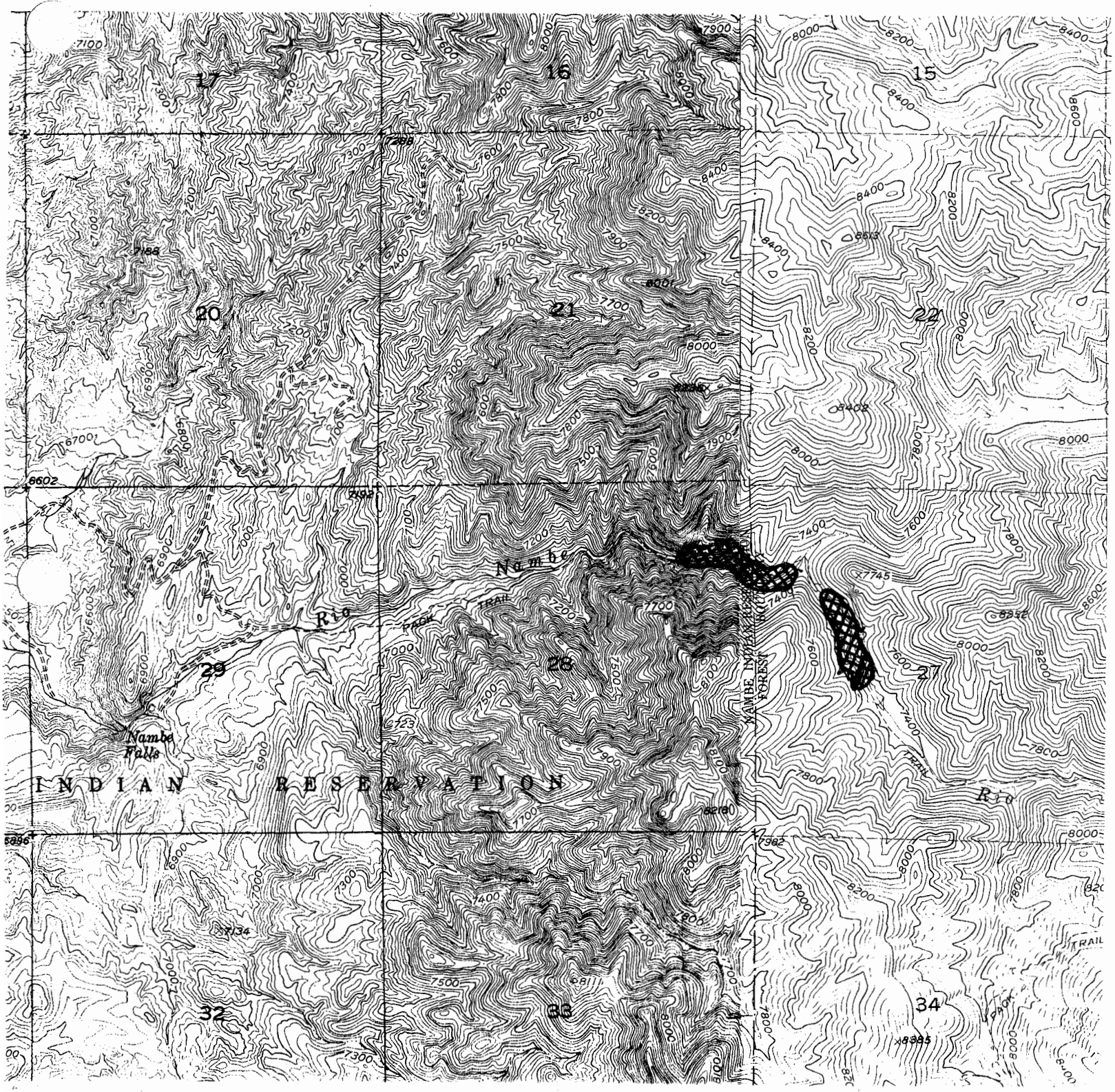

Figure 9.--Douglas-fir tussock moth infestation area, 1979. Nambe Indian Reservation and Pecos Wilderness Area, Santa Fe National Forest.

Scale: 1:24000, 2-3/8 inches to the mile.

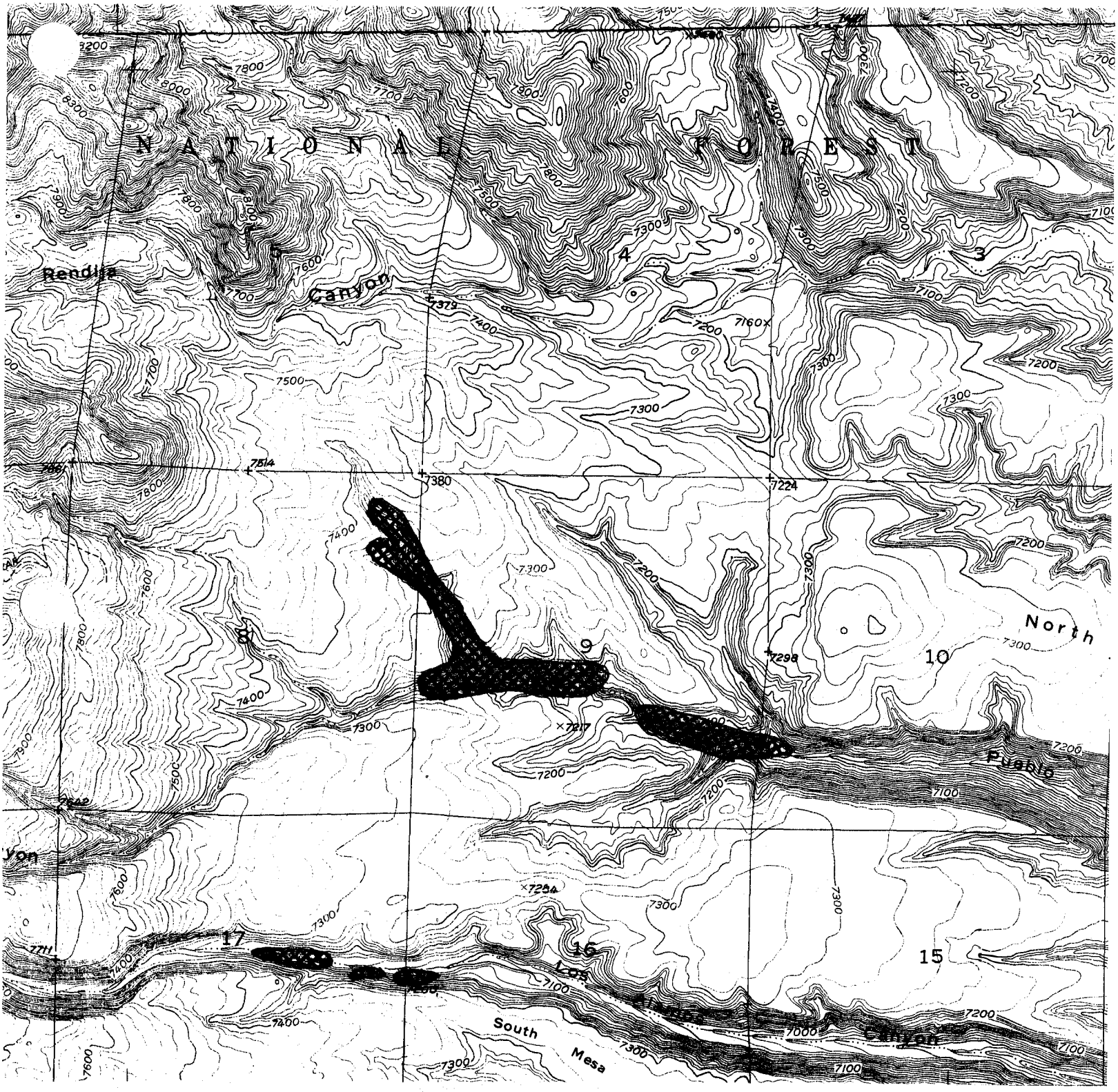

Figure 10.--Douglas-fir tussock moth infestation area, 1979. Los Alamos and Pueblo Canyons, within the townsite of Los Alamos and nearby lands in Los Alamos County (includes lands managed by Department of Energy and the Santa Fe National Forest).

Scale: 1:24000, 2-3/8 inches to the mile.

Figure 11.--Douglas-fir and true fir mortality in Pueblo Canyon, Los Alamos, New Mexico, 1979.

SURVEY SUMMARY
19 FEB 80

POPULATION STAND TABLE
OVERSTORY BEAR CANYON
HOST SPECIES IS DOUG-FIR THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS VARIABLE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 18 PLOTS, AND
REPRESENT AN AREA OF 130.ACRES.

BAF WAS 20.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES
PER ACRE

DBH	DOUGFIR LIVE	DEAD DOUGFIR	TOPKILL DF		TOPKILL&DEAD	PERCENT	TOTAL	PERCENTILE
5.0- 5.9	.000	13.523	.000	.000	13.523	100.000	13.523	42.616
6.0- 6.9	.000	4.538	.000	.000	4.538	100.000	4.538	14.302
10.0- 10.9	.000	3.630	.000	.000	3.630	100.000	3.630	11.440
11.0- 11.9	1.684	1.684	.000	.000	1.684	50.000	3.367	10.612
12.0- 12.9	.000	1.304	.000	.000	1.304	100.000	1.304	4.109
14.0- 14.9	.000	2.079	.000	.000	2.079	100.000	2.079	6.551
15.0- 15.9	.000	.848	.000	.000	.848	100.000	.848	2.672
16.0- 16.9	.000	.796	.000	.000	.796	100.000	.796	2.508
18.0- 18.9	.000	1.230	.000	.000	1.230	100.000	1.230	3.878
25.0- 25.9	.000	.313	.000	.000	.313	100.000	.313	.987
44.0- 44.9	.000	.103	.000	.000	.103	100.000	.103	.324
TOTAL	1.68	30.05	.00	.00	30.05	94.69	31.73	100.00
PERCENT	5.31	94.69	.00	.00	94.69			

AVERAGE DIAMETER FOR HOST TREES

DOUGFIR LIVE	DEAD DOUGFIR	TOPKILL DF		TOPKILL&DEAD	TOTAL
11.0000	15.2200	.0000	.0000	15.2200	14.9562

FOREST INSECT AND DISEASE

SURVEY SUMMARY

19 FEB 80

STATISTICAL ANALYSIS FOR HOST TREES

OVERSTORY REAR CANYON

	AVE. NO. OF TREES PER ACRE	STANDARD DEVIATION	STANDARD ERROR	COEFFICIENT OF VARIATION	ESTIMATED NO. OF TREES	
					LOWER LIMIT	UPPER LIMIT
DOUGFIR LIVE	1.68362	.71430114+01	.16836239+01	424.26406	.19371510-05	.43774222+03
DEAD DOUGFIR	30.04731	.54357635+02	.12812217+02	180.90682	.22405622+04	.55717387+04
TOPKILL DF	.00000	.00000000	.00000000	.00000	.00000000	.00000000
	.00000	.00000000	.00000000	.00000	.00000000	.00000000
TOPKILL&DEAD	30.04731	.54357635+02	.12812217+02	180.90682	.22405622+04	.55717387+04
TOTAL	31.73094	.58958958+02	.13896760+02	185.80907	.23184428+04	.59316003+04

SURVEY SUMMARY
20 FEB 80

POPULATION STAND TABLE
BEAR CANYON OVERSTORY
HOST SPECIES IS TRUE FIRS THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS VARIABLE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 18 PLOTS, AND
REPRESENT AN AREA OF 130. ACRES.

BAF WAS 20.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES
PER ACRE

DBH	TRUEFIR LIVE	DEAD TRUEFIR	TOPKILL TF			PERCENT	TOTAL	PERCENTILE
5.0- 5.9	.000	37.862	.000	.000	37.862	100.000	37.862	34.284
6.0- 6.9	.000	10.599	.000	.000	10.599	100.000	10.599	9.598
7.0- 7.9	.000	10.738	.000	.000	10.738	100.000	10.738	9.723
8.0- 8.9	.000	5.987	.000	.000	5.987	100.000	5.987	5.421
9.0- 9.9	.000	16.384	.000	.000	16.384	100.000	16.384	14.836
10.0- 10.9	.000	9.798	.000	.000	9.798	100.000	9.798	8.872
11.0- 11.9	.000	6.013	.000	.000	6.013	100.000	6.013	5.445
12.0- 12.9	.000	4.087	.000	.000	4.087	100.000	4.087	3.701
13.0- 13.9	.000	3.377	.000	.000	3.377	100.000	3.377	3.058
14.0- 14.9	.000	2.008	.000	.000	2.008	100.000	2.008	1.819
17.0- 17.9	.000	.650	.000	.000	.650	100.000	.650	.589
19.0- 19.9	.000	1.077	.000	.000	1.077	100.000	1.077	.975
21.0- 21.9	.000	.449	.000	.000	.449	100.000	.449	.407
29.0- 29.9	.000	.242	.000	.000	.242	100.000	.242	.219
32.0- 32.9	.000	.199	.000	.000	.199	100.000	.199	.180
33.0- 33.9	.000	.183	.000	.000	.183	100.000	.183	.165
35.0- 35.9	.000	.162	.000	.000	.162	100.000	.162	.146
38.0- 38.9	.000	.271	.000	.000	.271	100.000	.271	.245
39.0- 39.9	.000	.133	.000	.000	.133	100.000	.133	.121
41.0- 41.9	.000	.121	.000	.000	.121	100.000	.121	.110
46.0- 46.9	.000	.095	.000	.000	.095	100.000	.095	.086
TOTAL	.00	110.44	.00	.00	110.44	100.00	110.44	100.00
PERCENT	.00	100.00	.00	.00	100.00			

AVERAGE DIAMETER FOR HOST TREES

						TOTAL
	.0000	15.4714	.0000	.0000	15.4714	15.4714

STATISTICAL ANALYSIS FOR HOST TREES

BEAR CANYON OVERSTORY

	AVE. NO. OF TREES PER ACRE	STANDARD DEVIATION	STANDARD ERROR	COEFFICIENT OF VARIATION	ESTIMATED NO. OF TREES LOWER LIMIT	ESTIMATED NO. OF TREES UPPER LIMIT
TRUEFIR LIVE	.00000	.00000000	.00000000	.00000	.00000000	.00000000
DEAD TRUEFIR	110.43506	.14809234+03	.34905699+02	134.09902	.98188175+04	.18894299+05
TOPKILL TF	.00000	.00000000	.00000000	.00000	.00000000	.00000000
	.00000	.00000000	.00000000	.00000	.00000000	.00000000
	110.43506	.14809234+03	.34905699+02	134.09902	.98188175+04	.18894299+05
TOTAL	110.43506	.14809234+03	.34905699+02	134.09902	.98188175+04	.18894299+05

SURVEY SUMMARY
19 FEB 80

POPULATION STAND TABLE
BEAR CANYON OVERSTORY
HOST SPECIES IS TRUE FIRS THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS VARIABLE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 18 PLOTS, AND REPRESENT AN AREA OF 130. ACRES.

BAF WAS 20.

THIS TABLE ONLY INCLUDES NON-HOST TREES

NUMBERS OF TREES PER ACRE

DBH	POND PINE	WHITE PINE		OTHER	TOTAL	PERCENTILE
21.0- 21.9	.453	.000	.000	.000	.453	34.756
24.0- 24.9	.339	.000	.000	.000	.339	26.024
28.0- 28.9	.251	.000	.000	.000	.251	19.231
36.0- 36.9	.155	.000	.000	.000	.155	11.920
44.0- 44.9	.105	.000	.000	.000	.105	8.069
TOTAL	1.30	.00	.00	.00	1.30	100.00
PERCENT	100.00	.00	.00	.00	100.00	

AVERAGE DIAMETER FOR NON-HOST TREES

POND PINE	WHITE PINE		OTHER	TOTAL
30.8800	.0000	.0000	.0000	30.8800

FOREST INSECT AND DISEASE

SURVEY SUMMARY

19 FEB 80

STATISTICAL ANALYSIS FOR NON-HOST TREES

BEAR CANYON OVERSTORY

	AVE. NO. OF TREES PER ACRE	STANDARD DEVIATION	STANDARD ERROR	COEFFICIENT OF VARIATION	ESTIMATED NO. OF TREES LOWER LIMIT	ESTIMATED NO. OF TREES UPPER LIMIT
POND PINE	1.30415	.2486097E+01	.5859788E+00	190.62923	.93362700+02	.2457172E+03
WHITE PINE	.00000	.00000000	.00000000	.00000	.00000000	.00000000
	.00000	.00000000	.00000000	.00000	.00000000	.00000000
OTHER	.00000	.00000000	.00000000	.00000	.00000000	.00000000
TOTAL	1.30415	.2486097E+01	.5859788E+00	190.62923	.93362700+02	.2457172E+03

SURVEY SUMMARY
22 FEB 80

POPULATION STAND TABLE
REGEN BEAR CANYON
HOST SPECIES IS DOUGLAS FIR THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS FIXED THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 18 PLOTS, AND
REPRESENT AN AREA OF 130. ACRES.

PLOT SIZE = .010 ACRES.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES
PER ACRE

DBH	DOUGFIR LIVE	DEAD DOUGFIR	TOPKILL DF		DEAD&TOPKILL	PERCENT	TOTAL	PERCENTILE
.4- .9	.000	5.556	.000	.000	5.556	100.000	5.556	25.000
1.0- 1.9	.000	5.556	.000	.000	5.556	100.000	5.556	25.000
2.0- 2.9	.000	5.556	.000	.000	5.556	100.000	5.556	25.000
4.0- 4.9	.000	5.556	.000	.000	5.556	100.000	5.556	25.000
TOTAL	.00	22.22	.00	.00	22.22	100.00	22.22	100.00
PERCENT	.00	100.00	.00	.00	100.00			

AVERAGE DIAMETER FOR HOST TREES

DOUGFIR LIVE	DEAD DOUGFIR	TOPKILL DF		DEAD&TOPKILL	TOTAL
.0000	2.4250	.0000	.0000	2.4250	2.4250

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SURVEY SUMMARY
20 FEB 80

POPULATION STAND TABLE
REGENERATION REAR CANYON
HOST SPECIES IS TRUE FIRS THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS FIXED R THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 18 PLOTS, AND REPRESENT AN AREA OF 130. ACRES.

PLOT SIZE = .010 ACRES.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES PER ACRE

DBH	TRUEFIR LIVE	DEADTRUE FIR	TOPKILL TF		DEAD&TOPKILL	PERCENT	TOTAL	PERCENTILE
.4- .9	.000	88.889	.000	.000	88.889	100.000	88.889	32.653
1.0- 1.9	.000	77.778	.000	.000	77.778	100.000	77.778	28.571
2.0- 2.9	.000	50.000	.000	.000	50.000	100.000	50.000	18.367
3.0- 3.9	.000	44.444	.000	.000	44.444	100.000	44.444	16.327
4.0- 4.9	.000	11.111	.000	.000	11.111	100.000	11.111	4.082
TOTAL	.00	272.22	.00	.00	272.22	100.00	272.22	100.00
PERCENT	.00	100.00	.00	.00	100.00			

AVERAGE DIAMETER FOR HOST TREES

TRUEFIR LIVE	DEADTRUE FIR	TOPKILL TF		DEAD&TOPKILL	TOTAL
.0000	1.8633	.0000	.0000	1.8633	1.8633

SURVEY SUMMARY
20 FEB 80

POPULATION STAND TABLE
EGENERATION REAR CANYON
HOST SPECIES IS TRUE FIRS THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS FIXED R THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 18 PLOTS, AND REPRESENT AN AREA OF 130.ACRES.

PLOT SIZE = .010 ACRES.

THIS TABLE ONLY INCLUDES NON-HOST TREES

NUMBERS OF TREES

PER ACRE

DBH	PONDEROSA P.	WHITE PINE		OTHER	TOTAL	PERCENTILE
4.0- 4.9	11.111	.000	.000	.000	11.111	100.000
TOTAL	11.11	.00	.00	.00	11.11	100.00
PERCENT	100.00	.00	.00	.00	100.00	

AVERAGE DIAMETER FOR NON-HOST TREES

PONDEROSA P.	WHITE PINE		OTHER	TOTAL
4.4500	.0000	.0000	.0000	4.4500

SURVEY SUMMA[illegible]
20 FEB 80

POPULATION STAND TABLE
OVERSTORY MEDIO DIA CAN
HOST SPECIES IS DOUG-FIR THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS VARIABLE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 20 PLOTS, AND
REPRESENT AN AREA OF 125. ACRES.

BAF WAS 20.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES

PER ACRE

DBH	DOUGFIR LIVE	DEAD DOUGFIR	TOPKILL DF		DEAD&TOPKILL	PERCENT	TOTAL	PERCENTILE
5.0- 5.9	.000	5.267	12.815	.000	18.082	100.000	18.082	39.587
6.0- 6.9	.000	10.186	.000	.000	10.186	100.000	10.186	22.300
7.0- 7.9	3.348	.000	.000	.000	.000	.000	3.348	7.330
8.0- 8.9	2.538	5.344	.000	.000	5.344	67.802	7.881	17.255
16.0- 16.9	.000	1.366	.000	.000	1.366	100.000	1.366	2.990
17.0- 17.9	.634	.599	.000	.000	.599	48.551	1.233	2.700
18.0- 18.9	.000	.519	.000	.000	.519	100.000	.519	1.136
22.0- 22.9	.000	.000	.353	.000	.353	100.000	.353	.772
24.0- 24.9	.000	.000	.301	.000	.301	100.000	.301	.658
25.0- 25.9	.000	.000	.293	.000	.293	100.000	.293	.642
26.0- 26.9	.000	.259	.530	.000	.789	100.000	.789	1.728
27.0- 27.9	.000	.241	.000	.000	.241	100.000	.241	.527
28.0- 28.9	.000	.234	.000	.000	.234	100.000	.234	.512
30.0- 30.9	.000	.193	.000	.000	.193	100.000	.193	.423
32.0- 32.9	.177	.177	.000	.000	.177	50.000	.354	.774
33.0- 33.9	.000	.000	.166	.000	.166	100.000	.166	.364
36.0- 36.9	.000	.000	.138	.000	.138	100.000	.138	.301
TOTAL	6.70	24.38	14.60	.00	38.98	85.34	45.68	100.00
PERCENT	14.66	53.38	31.95	.00	85.34			

AVERAGE DIAMETER FOR HOST TREES

DOUGFIR LIVE	DEAD DOUGFIR	TOPKILL DF		DEAD&TOPKILL	TOTAL
16.2750	17.7714	22.8333	.0000	19.7522	19.2370

FOREST INSECT AND DISEASE

SURVEY SUMMARY

20 ~~FEB~~ 80

STATISTICAL ANALYSIS FOR HOST TREES

OVERSTORY MEDIO DIA CAN

	AVE. NO. OF TREES PER ACRE	STANDARD DEVIATION	STANDARD ERROR	COEFFICIENT OF VARIATION	ESTIMATED NO. OF TREES LOWER LIMIT	ESTIMATED NO. OF TREES ~~UPPER~~ LIMIT
DOUGFIR LIVE	6.69711	.18262017+02	.40835111+01	272.68523	.32669925+03	.13475770+04
DEAD DOUGFIR	24.38380	.71025109+02	.15881697+02	291.27986	.10627633+04	.50331876+04
TOPKILL DF	14.59543	.38976417+02	.87153916+01	267.04543	.73500420+03	.29138521+04
	.00000	.00000000	.00000000	.00000	.00000000	.00000000
DEAD&TOPKILL	38.97923	.76463147+02	.17097679+02	196.16383	.27351937+04	.70096134+04
TOTAL	45.67633	.82113770+02	.18361197+02	179.77312	.34143920+04	.80046912+04

SURVEY SUMMARY
20 FEB 80

POPULATION STAND TABLE
OVERSTORY MEDIO DIA CAN
HOST SPECIES IS TRUE FIR THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS VARIABLE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 20 PLOTS, AND
REPRESENT AN AREA OF 125.ACRES.

BAF WAS 20.

THIS TABLE ONLY INCLUDES HOST TREES

SQ. FT. OF BASAL AREA

PER ACRE

DBH	TRUEFIR LIVE	DEAD TRUEFIR	TOPKILL TF		DEAD&TOPKILL	PERCENT	TOTAL	PERCENTILE
5.0- 5.9	1.000	2.000	.000	.000	2.000	66.667	3.000	8.571
6.0- 6.9	.000	2.000	.000	.000	2.000	100.000	2.000	5.714
7.0- 7.9	1.000	1.000	.000	.000	1.000	50.000	2.000	5.714
9.0- 9.9	1.000	.000	.000	.000	.000	.000	1.000	2.857
10.0- 10.9	.000	.000	1.000	.000	1.000	100.000	1.000	2.857
12.0- 12.9	1.000	.000	1.000	.000	1.000	50.000	2.000	5.714
14.0- 14.9	.000	1.000	1.000	.000	2.000	100.000	2.000	5.714
15.0- 15.9	.000	2.000	.000	.000	2.000	100.000	2.000	5.714
16.0- 16.9	1.000	1.000	1.000	.000	2.000	66.667	3.000	8.571
17.0- 17.9	.000	1.000	1.000	.000	2.000	100.000	2.000	5.714
18.0- 18.9	.000	1.000	.000	.000	1.000	100.000	1.000	2.857
20.0- 20.9	.000	.000	2.000	.000	2.000	100.000	2.000	5.714
21.0- 21.9	1.000	2.000	1.000	.000	3.000	75.000	4.000	11.429
23.0- 23.9	.000	1.000	.000	.000	1.000	100.000	1.000	2.857
24.0- 24.9	.000	1.000	.000	.000	1.000	100.000	1.000	2.857
26.0- 26.9	.000	1.000	1.000	.000	2.000	100.000	2.000	5.714
27.0- 27.9	.000	1.000	.000	.000	1.000	100.000	1.000	2.857
31.0- 31.9	.000	.000	1.000	.000	1.000	100.000	1.000	2.857
32.0- 32.9	.000	.000	1.000	.000	1.000	100.000	1.000	2.857
33.0- 33.9	.000	1.000	.000	.000	1.000	100.000	1.000	2.857
TOTAL	6.00	18.00	11.00	.00	29.00	82.86	35.00	100.00
PERCENT	17.14	51.43	31.43	.00	82.86			

SURVEY SUM
20 FEB 8

POPULATION STAND TABLE
OVERSTORY MEDIO DIA CAN
HOST SPECIES IS TRUE FIR THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS VARIABLE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 20 PLOTS, AND
REPRESENT AN AREA OF 125. ACRES.

BAF WAS 20.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES
PER ACRE

DBH	TRUEFIR LIVE	DEAD TRUEFIR	TOPKILL TF		DEAD&TOPKILL	PERCENT	TOTAL	PERCENTILE
5.0- 5.9	5.267	14.668	.000	.000	14.668	73.579	19.935	36.837
6.0- 6.9	.000	10.186	.000	.000	10.186	100.000	10.186	18.823
7.0- 7.9	3.259	2.938	.000	.000	2.938	47.404	6.197	11.452
9.0- 9.9	2.264	.000	.000	.000	.000	.000	2.264	4.183
10.0- 10.9	.000	.000	1.663	.000	1.663	100.000	1.663	3.073
12.0- 12.9	1.173	.000	1.119	.000	1.119	48.814	2.292	4.236
14.0- 14.9	.000	.922	.848	.000	1.771	100.000	1.771	3.272
15.0- 15.9	.000	1.507	.000	.000	1.507	100.000	1.507	2.785
16.0- 16.9	.665	.716	.690	.000	1.406	67.882	2.072	3.828
17.0- 17.9	.000	.620	.579	.000	1.198	100.000	1.198	2.215
18.0- 18.9	.000	.566	.000	.000	.566	100.000	.566	1.046
20.0- 20.9	.000	.000	.882	.000	.882	100.000	.882	1.630
21.0- 21.9	.416	.832	.382	.000	1.214	74.487	1.630	3.011
23.0- 23.9	.000	.335	.000	.000	.335	100.000	.335	.619
24.0- 24.9	.000	.305	.000	.000	.305	100.000	.305	.564
26.0- 26.9	.000	.271	.271	.000	.542	100.000	.542	1.002
27.0- 27.9	.000	.237	.000	.000	.237	100.000	.237	.438
31.0- 31.9	.000	.000	.186	.000	.186	100.000	.186	.344
32.0- 32.9	.000	.000	.179	.000	.179	100.000	.179	.331
33.0- 33.9	.000	.168	.000	.000	.168	100.000	.168	.311
TOTAL	13.04	34.27	6.80	.00	41.07	75.89	54.12	100.00
PERCENT	24.11	63.33	12.57	.00	75.89			

AVERAGE DIAMETER FOR HOST TREES

TRUEFIR LIVE	DEAD TRUEFIR	TOPKILL TF	DEAD&TOPKILL	TOTAL

12.0833	10.8389	20.3818	.0000	18.1828	17.1371

STATISTICAL ANALYSIS FOR HOST TREES

OVERSTORY MEDIO DIA CAN

	AVE. NO. OF TREES PER ACRE	STANDARD DEVIATION	STANDARD ERROR	COEFFICIENT OF VARIATION	ESTIMATED NO. OF TREES LOWER LIMIT	UPPER LIMIT
TRUEFIR LIVE	13.04463	.36514361+02	.81648594+01	279.91863	.60997180+03	.26511866+04
DEAD TRUEFIR	34.27108	.11054872+03	.24719446+02	322.57141	.11939549+04	.73738163+04
TOPKILL TF	6.79996	.13878564+02	.31033412+01	204.09786	.46207680+03	.12379121+04
	.00000	.00000000	.00000000	.00000	.00000000	.00000000
DEAD&TOPKILL	41.07104	.10940221+03	.24463078+02	266.37312	.20759952+04	.81917647+04
TOTAL	54.11567	.11129420+03	.24886139+02	205.65981	.36536919+04	.98752264+04

SURVEY SUMM
20 FEB 80

POPULATION STAND TABLE
OVERSTORY MEDIO DIA CAN
HOST SPECIES IS DOUG-FIR THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS VARIABLE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 20 PLOTS, AND REPRESENT AN AREA OF 125. ACRES.

BAF WAS 20.

THIS TABLE ONLY INCLUDES NON-HOST TREES

NUMBERS OF TREES

PER ACRE

DBH	PONDEROSA P.	WHITE PINE		OTHER	TOTAL	PERCENTILE
5.0- 5.9	7.334	.000	.000	.000	7.334	17.920
7.0- 7.9	3.637	.000	.000	.000	3.637	8.887
8.0- 8.9	5.179	2.315	.000	.000	7.494	18.311
9.0- 9.9	8.634	.000	.000	.000	8.634	21.095
11.0- 11.9	1.295	.000	.000	.000	1.295	3.164
12.0- 12.9	2.546	.000	.000	.000	2.546	6.222
13.0- 13.9	1.006	.000	.000	.000	1.006	2.458
15.0- 15.9	.783	.000	.000	.000	.783	1.914
16.0- 16.9	.650	.000	.000	.000	.650	1.587
17.0- 17.9	1.839	.000	.000	.000	1.839	4.493
18.0- 18.9	.513	.000	.000	.000	.513	1.254
19.0- 19.9	.950	.000	.000	.000	.950	2.321
20.0- 20.9	1.344	.000	.000	.000	1.344	3.285
22.0- 22.9	.715	.000	.000	.000	.715	1.747
23.0- 23.9	.347	.000	.000	.000	.347	.847
24.0- 24.9	.303	.318	.000	.000	.621	1.518
27.0- 27.9	.492	.000	.000	.000	.492	1.203
29.0- 29.9	.214	.000	.000	.000	.214	.522
31.0- 31.9	.182	.000	.000	.000	.182	.446
33.0- 33.9	.331	.000	.000	.000	.331	.808
TOTAL	38.29	2.63	.00	.00	40.93	100.00
PERCENT	93.57	6.43	.00	.00	100.00	

AVERAGE DIAMETER FOR NON-HOST TREES

PONDEROSA P.	WHITE PINE		OTHER	TOTAL

*	17.9788	16.4500	.0000	.0000	17.8914

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20 FEB 80

STATISTICAL ANALYSIS FOR NON-HOST TREES

OVERSTORY MEDIO DIA CAN

	AVE. NO. OF TREES PER ACRE	STANDARD DEVIATION	STANDARD ERROR	COEFFICIENT OF VARIATION	ESTIMATED NO. OF TREES LOWER LIMIT	ESTIMATED NO. OF TREES UPPER LIMIT
PONDEROSA P.	38.29337	.4698707+02	.1050526+02	122.68628	.3473520+04	.6099816+04
WHITE PINE	2.63300	.1177513E+02	.2633000E+01	447.21359	.3725290E-05	.6582501E+03
	.00000	.00000000	.00000000	.00000	.00000000	.00000000
OTHER	.00000	.00000000	.00000000	.00000	.00000000	.00000000
TOTAL	40.92637	.4619063+02	.1032853+02	112.86277	.3824728+04	.6406863+04

SURVEY SUMMARY
21 FEB 80

POPULATION STAND TABLE
GEN MEDIO DIA CANYON
HOST SPECIES IS DOUGLAS FIR THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS FIXED RE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 20 PLOTS, AND REPRESENT AN AREA OF 125. ACRES.

PLOT SIZE = .010 ACRES.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES PER ACRE

DBH	DOUGFIR LIVE	DEAD DOUGFIR	TOPKILL DF		DEAD&TOPKILL	PERCENT	TOTAL	PERCENTILE
.4- .9	40.000	25.000	15.000	.000	40.000	50.000	80.000	37.209
1.0- 1.9	15.000	30.000	.000	.000	30.000	66.667	45.000	20.930
2.0- 2.9	10.000	20.000	5.000	.000	25.000	71.429	35.000	16.279
3.0- 3.9	.000	20.000	5.000	.000	25.000	100.000	25.000	11.628
4.0- 4.9	.000	15.000	5.000	.000	20.000	100.000	20.000	9.302
TOTAL	75.00	110.00	30.00	.00	140.00	65.12	215.00	100.00
PERCENT	34.88	51.16	13.95	.00	65.12			

AVERAGE DIAMETER FOR HOST TREES

DOUGFIR LIVE	DEAD DOUGFIR	TOPKILL DF		DEAD&TOPKILL	TOTAL
1.1133	2.1955	2.1000	.0000	2.1750	1.8047

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SURVEY SUMMARY
20 FEB 80

POPULATION STAND TABLE
GEN MEDIU DIA CANYON
HOST SPECIES IS TRUE FIRS THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS FIXED RE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 20 PLOTS, AND
REPRESENT AN AREA OF 125.ACRES.

PLOT SIZE = .010 ACRES.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES
PER ACRE

DBH	TRUEFIR LIVE	DEAD TRUEFIR	TOPKILL TF			PERCENT	TOTAL	PERCENTILE
.4- .9	20.000	50.000	.000	.000	50.000	71.429	70.000	38.889
1.0- 1.9	35.000	15.000	5.000	.000	20.000	36.364	55.000	30.556
2.0- 2.9	.000	20.000	.000	.000	20.000	100.000	20.000	11.111
3.0- 3.9	10.000	5.000	5.000	.000	10.000	50.000	20.000	11.111
4.0- 4.9	15.000	.000	.000	.000	.000	.000	15.000	8.333
TOTAL	80.00	90.00	10.00	.00	100.00	55.56	180.00	100.00
PERCENT	44.44	50.00	5.56	.00	55.56			

AVERAGE DIAMETER FOR HOST TREES

TRUEFIR LIVE	DEAD TRUEFIR	TOPKILL TF			TOTAL
2.1312	1.4778	2.4500	.0000	1.5750	1.8222

SURVEY SUMMARY
20 FEB 80

POPULATION STAND TABLE
GEN MEDIN DIA CANYON
HOST SPECIES IS TRUE FIRS THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS FIXED RE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 20 PLOTS, AND
REPRESENT AN AREA OF 125. ACRES.

PLOT SIZE = .010 ACRES.

THIS TABLE ONLY INCLUDES NON-HOST TREES

NUMBERS OF TREES
PER ACRE

DBH	PONDEROSA P.	WHITE PINE		OTHER	TOTAL	PERCENTILE
.4- .9	10.000	55.000	.000	.000	15.000	25.000
1.0- 1.9	5.000	.000	.000	.000	5.000	8.333
2.0- 2.9	5.000	.000	.000	.000	5.000	8.333
3.0- 3.9	15.000	.000	.000	.000	15.000	25.000
4.0- 4.9	20.000	.000	.000	.000	20.000	33.333
TOTAL	55.00	5.00	.00	.00	60.00	100.00
PERCENT	91.67	8.33	.00	.00	100.00	

AVERAGE DIAMETER FOR NON-HOST TREES

PONDEROSA P.	WHITE PINE		OTHER	TOTAL
2.8727	.9000	.0000	.0000	2.7083

SURVEY SUMMARY
21 FEB 80

POPULATION STAND TABLE
OVERSTORY LA CANYON
HOST SPECIES IS DOUG-FIR

THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS VARIABLE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 15 PLOTS, AND

REPRESENT AN AREA OF 50.ACRES.

BAF WAS 20.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES

PER ACRE

DBH	DOUGFIR LIVE	DEAD DOUGFIR	TOPKILL DF		DEAD&TOPKILL	PERCENT	TOTAL	PERCENTILE
5.0- 5.9	.000	31.953	16.666	.000	48.618	100.000	48.618	32.902
6.0- 6.9	.000	28.133	6.360	.000	34.492	100.000	34.492	23.342
7.0- 7.9	9.180	18.070	.000	.000	18.070	66.312	27.250	18.441
8.0- 8.9	7.013	10.509	3.636	.000	14.144	66.852	21.157	14.318
9.0- 9.9	.000	5.715	2.952	.000	8.667	100.000	8.667	5.865
10.0- 10.9	.000	2.445	.000	.000	2.445	100.000	2.445	1.654
12.0- 12.9	.000	1.698	.000	.000	1.698	100.000	1.698	1.149
15.0- 15.9	.000	2.025	.000	.000	2.025	100.000	2.025	1.370
16.0- 16.9	.000	.920	.000	.000	.920	100.000	.920	.623
22.0- 22.9	.000	.496	.000	.000	.496	100.000	.496	.336
TOTAL	16.19	101.96	29.61	.00	131.58	89.04	147.77	100.00
PERCENT	10.96	69.00	20.04	.00	89.04			

AVERAGE DIAMETER FOR HOST TREES

DOUGFIR LIVE	DEAD DOUGFIR	TOPKILL DF		DEAD&TOPKILL	TOTAL
7.8250	9.1667	6.8800	.0000	8.7724	8.6576

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FOREST INSECT AND DISEASE

SURVEY SUMMARY

21 FEB 80

STATISTICAL ANALYSIS FOR HOST TREES

OVERSTORY LA CANYON

	AVE. NO. OF TREES PER ACRE	STANDARD DEVIATION	STANDARD ERROR	COEFFICIENT OF VARIATION	ESTIMATED NO. OF TREES LOWER LIMIT	ESTIMATED NO. OF TREES UPPER LIMIT
DOUGFIR LIVE	16.19314	.28143102+02	.72665178+01	173.79643	.44633119+03	.11729829+04
DEAD DOUGFIR	101.96195	.10773163+03	.27816186+02	105.65866	.37072880+04	.64889066+04
TOPKILL DF	29.61312	.68311823+02	.17638037+02	230.68096	.59875401+03	.23625576+04
	.00000	.00000000	.00000000	.00000	.00000000	.00000000
DEAD&TOPKILL	131.57506	.10924551+03	.28207069+02	83.02904	.51683997+04	.79891064+04
TOTAL	147.76820	.10800418+03	.27886560+02	73.09027	.59940820+04	.87827380+04

SURVEY SUMMARY
21 FEB 80

POPULATION STAND TABLE
OVERSTORY LA CANYON

HOST SPECIES IS TRUE FIRS THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS VARIABLE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 15 PLOTS, AND

REPRESENT AN AREA OF 50. ACRES.

BAF WAS 20.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES

PER ACRE

DBH	TRUE FIR	DEAD TRUEFIR	TOPKILL TF		DEAD&TOPKILL	PERCENT	TOTAL	PERCENTILE
5.0- 5.9	15.048	14.818	.000	.000	14.818	49.614	29.867	66.666
6.0- 6.9	.000	.000	6.570	.000	6.570	100.000	6.570	14.665
7.0- 7.9	.000	8.364	.000	.000	8.364	100.000	8.364	18.670
TOTAL	15.05	23.18	6.57	.00	29.75	66.41	44.80	100.00
PERCENT	33.59	51.75	14.66	.00	66.41			

AVERAGE DIAMETER FOR HOST TREES

TRUE FIR	DEAD TRUEFIR	TOPKILL TF		DEAD&TOPKILL	TOTAL
5.7000	6.7000	6.1000	.0000	6.5800	6.3286

FOREST INSECT AND DISEASE

SURVEY SUMMARY

21 FEB 80

STATISTICAL ANALYSIS FOR HOST TREES

OVERSTORY LA CANYON

	AVE. NO. OF TREES PER ACRE	STANDARD DEVIATION	STANDARD ERROR	COEFFICIENT OF VARIATION	ESTIMATED NO. OF TREES LOWER LIMIT	ESTIMATED NO. OF TREES UPPER LIMIT
TRUE FIR	15.04846	.39712780+02	.10253796+02	263.89933	.23973311+03	.12651127+04
DEAD TRUEFIR	23.18222	.59296985+02	.15310416+02	255.78649	.39359018+03	.19246317+04
TOPKILL TF	6.56980	.25444720+02	.65697984+01	387.29832	.29802322-05	.65697983+03
	.00000	.00000000	.00000000	.00000	.00000000	.00000000
DEAD&TOPKILL	29.75202	.61945167+02	.15994173+02	208.20493	.68789220+03	.22873095+04
TOTAL	44.80047	.66745070+02	.17233503+02	148.98295	.13783486+04	.31016989+04

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SURVEY SUMMARY

21 FEB 80

POPULATION STAND TABLE
OVERSTORY LA CANYON
HOST SPECIES IS DOUG-FIR

THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS VARIABLE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 15 PLOTS, AND REPRESENT AN AREA OF 50. ACRES.

BAF WAS 20.

THIS TABLE ONLY INCLUDES NON-HOST TREES

N U M B E R S O F T R E E S

P E R A C R E

DBH	PONDEROSA P.	WHITE PINE		OTHER	TOTAL	PERCENTILE
5.0- 5.9	9.041	17.045	.000	.000	26.086	73.874
10.0- 10.9	.000	2.217	.000	.000	2.217	6.279
12.0- 12.9	2.984	.000	.000	.000	2.984	8.451
17.0- 17.9	.000	.772	.000	.000	.772	2.185
18.0- 18.9	.000	1.399	.000	.000	1.399	3.961
20.0- 20.9	.582	.000	.000	.000	.582	1.647
23.0- 23.9	.905	.000	.000	.000	.905	2.562
25.0- 25.9	.367	.000	.000	.000	.367	1.040
TOTAL	13.88	21.43	.00	.00	35.31	100.00
PERCENT	39.30	60.70	.00	.00	100.00	

AVERAGE DIAMETER FOR NON-HOST TREES

PONDEROSA P.	WHITE PINE		OTHER	TOTAL
17.6571	12.7500	.0000	.0000	15.3923

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FOREST INSECT AND DISEASE

SURVEY SUMMARY

21 FEB 80

STATISTICAL ANALYSIS FOR NON-HOST TREES

OVERSTORY LA CANYON

	AVE. NO. OF TREES PER ACRE	STANDARD DEVIATION	STANDARD ERROR	COEFFICIENT OF VARIATION	ESTIMATED NO. OF TREES LOWER LIMIT	ESTIMATED NO. OF TREES UPPER LIMIT
PONDEROSA P.	13.87867	.34634529+02	.89425968+01	249.55218	.24680375+03	.11410634+04
WHITE PINE	21.43305	.52078993+02	.13446738+02	242.98452	.3993155B+03	.17439894+04
	.00000	.00000000	.00000000	.00000	.00000000	.00000000
OTHER	.00000	.00000000	.00000000	.00000	.00000000	.00000000
TOTAL	35.31172	.5722196 2+02	.14774647+02	162.04806	.10268537+04	.2504318 4+04

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SURVEY SUMMARY
21 FEB 80

POPULATION STAND TABLE
GEN LA CANYON
HOST SPECIES IS DOUG-FIR THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS FIXED RE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 15 PLOTS, AND
REPRESENT AN AREA OF 50.ACRES.

PLOT SIZE = .010 ACRES.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES
PER ACRE

DBH	DOUGFIR LIVE	DEAD DOUGFIR	TOPKILL DF		DEAD&TOPKILL	PERCENT	TOTAL	PERCENTILE
.4- .9	113.333	146.667	66.667	.000	213.333	65.306	326.667	43.363
1.0- 1.9	33.333	113.333	26.667	.000	140.000	80.769	173.333	23.009
2.0- 2.9	26.667	133.333	.000	.000	133.333	83.333	160.000	21.239
3.0- 3.9	6.667	60.000	6.667	.000	66.667	90.909	73.333	9.735
4.0- 4.9	.000	20.000	.000	.000	20.000	100.000	20.000	2.655
TOTAL	180.00	473.33	100.00	.00	573.33	76.11	753.33	100.00
PERCENT	23.89	62.83	13.27	.00	76.11			

AVERAGE DIAMETER FOR HOST TREES

DOUGFIR LIVE	DEAD DOUGFIR	TOPKILL DF		DEAD&TOPKILL	TOTAL
1.3111	1.8352	1.0933	.0000	1.7058	1.6115

SURVEY SUMMARY
21 FEB 80

POPULATION STAND TABLE
GEN LA CANYON
HOST SPECIES IS TRUE FIRS THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS FIXED RE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 15 PLOTS, AND
REPRESENT AN AREA OF 50. ACRES.

PLOT SIZE = .010 ACRES.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES
PER ACRE

DBH	TRUEFIR LIVE	DEAD TRUEFIR	TOPKILL TF			PERCENT	TOTAL	PERCENTILE
.4- .9	6.667	.000	6.667	.000	6.667	49.998	13.334	28.572
1.0- 1.9	.000	.000	6.667	.000	6.667	99.995	6.667	14.286
2.0- 2.9	6.667	.000	.000	.000	.000	.002	6.667	14.286
3.0- 3.9	6.667	.000	.000	.000	.000	.002	6.667	14.286
4.0- 4.9	6.667	6.667	.000	.000	6.667	49.999	13.334	28.570
TOTAL	26.67	6.67	13.33	.00	20.00	42.86	46.67	100.00
PERCENT	57.14	14.29	28.57	.00	42.86			

AVERAGE DIAMETER FOR HOST TREES

TRUEFIR LIVE	DEAD TRUEFIR	TOPKILL TF			TOTAL
2.1667	3.0500	2.2000	.0000	2.5400	2.2600

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SURVEY SUMMARY
21 FEB 80

POPULATION STAND TABLE
GEN LA CANYON
HOST SPECIES IS TRUE FIRS THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS FIXED RE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 15 PLOTS, AND
REPRESENT AN AREA OF 50. ACRES.

PLOT SIZE = .010 ACRES.

THIS TABLE ONLY INCLUDES NON-HOST TREES

NUMBERS OF TREES
PER ACRE

DBH	PONDEROSA P.	WHITE PINE		OTHER	TOTAL	PERCENTILE
.4- .9	6.667	13.333	.000	.000	20.000	50.000
1.0- 1.9	.000	6.667	.000	.000	6.667	16.667
2.0- 2.9	6.667	.000	.000	.000	6.667	16.667
4.0- 4.9	6.667	.000	.000	.000	6.667	16.667
TOTAL	20.00	20.00	.00	.00	40.00	100.00
PERCENT	50.00	50.00	.00	.00	100.00	

AVERAGE DIAMETER FOR NON-HOST TREES

PONDEROSA P.	WHITE PINE		OTHER	TOTAL
2.4000	1.2333	.0000	.0000	1.8167

SURVEY SUMMARY
21 FEB 80

POPULATION STAND TABLE
PUEBLO CANYON
HOST SPECIES IS DOUGLAS FIR THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS VARIABLE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 20 PLOTS, AND

REPRESENT AN AREA OF 100. ACRES.

BAF WAS 20.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES

PER ACRE

DBH	DOUG FIR	DEADDOUG FIR	TOPKILL DF		DEAD & TOPKL	PERCENT	TOTAL	PERCENTILE
5.0- 5.9	.000	6.288	.000	.000	6.288	100.000	6.288	25.280
6.0- 6.9	3.965	.000	.000	.000	.000	.000	3.965	15.942
7.0- 7.9	.000	3.348	.000	.000	3.348	100.000	3.348	13.462
8.0- 8.9	.000	7.335	.000	.000	7.335	100.000	7.335	29.493
12.0- 12.9	.000	1.173	.000	.000	1.173	100.000	1.173	4.718
14.0- 14.9	.000	1.796	.000	.000	1.796	100.000	1.796	7.219
15.0- 15.9	.000	.773	.000	.000	.773	100.000	.773	3.108
30.0- 30.9	.000	.193	.000	.000	.193	100.000	.193	.777
TOTAL	3.97	20.91	.00	.00	20.91	84.06	24.87	100.00
PERCENT	15.94	84.06	.00	.00	84.06			

AVERAGE DIAMETER FOR HOST TREES

DOUG FIR	DEADDOUG FIR	TOPKILL DF		DEAD & TOPKL	TOTAL
6.8000	12.6100	.0000	.0000	12.6100	12.0618

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SURVEY SUMMARY

21 FEB 80

STATISTICAL ANALYSIS FOR HOST TREES

PUEBLO CANYON

	AVE. NO. OF TREES PER ACRE	STANDARD DEVIATION	STANDARD ERROR	COEFFICIENT OF VARIATION	ESTIMATED NO. OF TREES LOWER LIMIT	ESTIMATED NO. OF TREES UPPER LIMIT
DOUG FIR	3.96511	.17732507+02	.39651092+01	447.21359	.29802322-05	.79302183+03
DEADDOUG FIR	20.90663	.32604252+02	.72905323+01	155.95171	.13616101+04	.28197165+04
TOPKILL DF	.00000	.00000000	.00000000	.00000	.00000000	.00000000
	.00000	.00000000	.00000000	.00000	.00000000	.00000000
DEAD & TOPKL	20.90663	.32604252+02	.72905323+01	155.95171	.13616101+04	.28197165+04
TOTAL	24.87174	.34683697+02	.77555104+01	139.45021	.17116232+04	.32627253+04

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SURVEY SUMMARY
21 FEB 80

POPULATION STAND TABLE
PUEBLO CANYON
HOST SPECIES IS TRUE FIRS THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS VARIABLE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 20 PLOTS, AND
REPRESENT AN AREA OF 100.ACRES.

BAF WAS 20.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES
PER ACRE

DBH	LIVE TRUEFIR	DEAD TRUEFIR	TOPKILL TFIR			PERCENT	TOTAL	PERCENTILE
6.0- 6.9	.000	14.229	.000	.000	14.229	100.000	14.229	55.856
7.0- 7.9	.000	7.279	.000	.000	7.279	100.000	7.279	28.571
11.0- 11.9	.000	1.363	.000	.000	1.363	100.000	1.363	5.349
13.0- 13.9	.000	1.970	.000	.000	1.970	100.000	1.970	7.733
17.0- 17.9	.000	.634	.000	.000	.634	100.000	.634	2.490
TOTAL	.00	25.47	.00	.00	25.47	100.00	25.47	100.00
PERCENT	.00	100.00	.00	.00	100.00			

AVERAGE DIAMETER FOR HOST TREES

LIVE TRUEFIR	DEAD TRUEFIR	TOPKILL TFIR			TOTAL
.0000	9.8667	.0000	.0000	9.8667	9.8667

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FOREST INSECT AND DISEASE

SURVEY SUMMARY

21 FEB 80

STATISTICAL ANALYSIS FOR HOST TREES

PUEBLO CANYON

	AVE. NO. OF TREES PER ACRE	STANDARD DEVIATION	STANDARD ERROR	COEFFICIENT OF VARIATION	ESTIMATED NO. OF TREES LOWER LIMIT	ESTIMATED NO. OF TREES UPPER LIMIT
LIVE TRUEFIR	.00000	.00000000	.00000000	.00000	.00000000	.00000000
DEAD TRUEFIR	25.47494	.61875111+02	.13835695+02	242.88619	.11639244+04	.39310634+04
TOPKILL TFIR	.00000	.00000000	.00000000	.00000	.00000000	.00000000
	.00000	.00000000	.00000000	.00000	.00000000	.00000000
	25.47494	.61875111+02	.13835695+02	242.88619	.11639244+04	.39310634+04
TOTAL	25.47494	.61875111+02	.13835695+02	242.88619	.11639244+04	.39310634+04

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SURVEY SUMMA[illegible]
21 FEB 80

POPULATION STAND TABLE
PUEBLO CANYON
HOST SPECIES IS DOUGLAS FIR THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS VARIABLE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 20 PLOTS, AND REPRESENT AN AREA OF 100. ACRES.

BAF WAS 20.

THIS TABLE ONLY INCLUDES NON-HOST TREES

NUMBERS OF TREES PER ACRE

DBH	PONDEROSA P.	WHITE PINE		OTHER	TOTAL	PERCENTILE
5.0- 5.9	13.621	.000	.000	.000	13.621	15.339
6.0- 6.9	27.388	.000	.000	.000	27.388	30.841
7.0- 7.9	9.211	2.938	.000	.000	12.149	13.680
8.0- 8.9	2.479	.000	.000	.000	2.479	2.792
9.0- 9.9	4.156	.000	.000	.000	4.156	4.680
10.0- 10.9	5.032	.000	.000	.000	5.032	5.667
11.0- 11.9	4.195	.000	.000	.000	4.195	4.723
12.0- 12.9	3.678	.000	.000	.000	3.678	4.142
13.0- 13.9	3.095	1.085	.000	.000	4.180	4.707
14.0- 14.9	4.317	.884	.000	.000	5.201	5.857
15.0- 15.9	1.527	.000	.000	.000	1.527	1.720
16.0- 16.9	1.989	.000	.000	.000	1.989	2.240
17.0- 17.9	.613	.000	.000	.579	1.191	1.341
18.0- 18.9	1.095	.000	.000	.000	1.095	1.233
19.0- 19.9	.482	.000	.000	.000	.482	.543
20.0- 20.9	.441	.000	.000	.000	.441	.496
TOTAL	83.32	4.91	.00	.58	88.80	100.00
PERCENT	93.82	5.53	.00	.65	100.00	

AVERAGE DIAMETER FOR NON-HOST TREES

PONDEROSA P.	WHITE PINE		OTHER	TOTAL
11.9341	11.7667	.0000	17.8000	12.0533

FOREST INSECT AND DISEASE

SURVEY SUMMARY

21 FEB 80

STATISTICAL ANALYSIS FOR NON-HOST TREES

PUEBLO CANYON

	AVE. NO. OF TREES PER ACRE	STANDARD DEVIATION	STANDARD ERROR	COEFFICIENT OF VARIATION	ESTIMATED NO. OF TREES LOWER LIMIT	ESTIMATED NO. OF TREES UPPER LIMIT
PONDEROSA P.	83.31905	.76777233+02	.17167911+02	92.14847	.66151138+04	.10048696+05
WHITE PINE	4.90686	.14056620+02	.31431558+01	286.46856	.17637072+03	.80500188+03
	.00000	.00000000	.00000000	.00000	.00000000	.00000000
OTHER	.57867	.25879028+01	.57867266+00	447.21359	.74505806-06	.11573453+03
TOTAL	88.80458	.74983937+02	.16766918+02	84.43701	.72037667+04	.10557150+05

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SURVEY SUMMARY
21 FEB 80

POPULATION STAND TABLE
PUEBLO CANYON
HOST SPECIES IS DOUGLAS FIR THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS FIXEDREG THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 20 PLOTS, AND
REPRESENT AN AREA OF 100.ACRES.

PLOT SIZE = .010 ACRES.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES
PER ACRE

DBH	DOUGFIR LIVE	DEAD DOUGFIR	TOPKILL DOUG			PERCENT	TOTAL	PERCENTILE
.4- .9	35.000	25.000	5.000	.000	30.000	46.154	65.000	40.625
1.0- 1.9	5.000	15.000	25.000	.000	40.000	88.889	45.000	28.125
2.0- 2.9	.000	15.000	5.000	.000	20.000	100.000	20.000	12.500
3.0- 3.9	10.000	15.000	5.000	.000	30.000	66.667	30.000	18.750
TOTAL	50.00	70.00	40.00	.00	110.00	68.75	160.00	100.00
PERCENT	31.25	43.75	25.00	.00	68.75			

AVERAGE DIAMETER FOR HOST TREES

DOUGFIR LIVE	DEAD DOUGFIR	TOPKILL DOUG			TOTAL
1.4400	1.8143	1.8375	.0000	1.8227	1.7031

FOREST INSECT AND DISEASE PAGE 1

SURVEY SUMMARY
21 FEB 80

POPULATION STAND TABLE
PUEBLO CANYON
HOST SPECIES IS TRUE FIRS THE PEST IS TUSSOCK MOTH

THE METHOD OF SAMPLING WAS FIXEDREG THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 20 PLOTS, AND
REPRESENT AN AREA OF 100.ACRES.

PLOT SIZE = .010 ACRES.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES
PER ACRE

DBH	TRUEFIR LIVE	DEAD TRUEFIR	TOPKILL TF			PERCENT	TOTAL	PERCENTILE
.4- .9	.000	30.000	.000	.000	30.000	100.000	30.000	50.000
1.0- 1.9	.000	10.000	.000	.000	10.000	100.000	10.000	16.667
2.0- 2.9	.000	5.000	5.000	.000	10.000	100.000	10.000	16.667
3.0- 3.9	.000	5.000	.000	.000	5.000	100.000	5.000	8.333
4.0- 4.9	.000	5.000	.000	.000	5.000	100.000	5.000	8.333
TOTAL	.00	55.00	5.00	.00	60.00	100.00	60.00	100.00
PERCENT	.00	91.67	8.33	.00	100.00			

AVERAGE DIAMETER FOR HOST TREES

TRUEFIR LIVE	DEAD TRUEFIR	TOPKILL TF			TOTAL
.0000	1.6273	2.1000	.0000	1.6667	1.6667

SURVEY SUMMARY
21 FEB 80

POPULATION STAND TABLE
PUEBLO CANYON
HOST SPECIES IS DOUGLAS FIR THE PEST IS TUSSOCK MOTH
THE METHOD OF SAMPLING WAS FIXEDREG THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 20 PLOTS, AND
REPRESENT AN AREA OF 100. ACRES.

PLOT SIZE = .010 ACRES.

THIS TABLE ONLY INCLUDES NON-HOST TREES

NUMBERS OF TREES
PER ACRE

DBH	POND PINE	WHITE PINE		OTHER	TOTAL	PERCENTILE
.4- .9	75.000	5.000	.000	.000	80.000	32.000
1.0- 1.9	70.000	5.000	.000	.000	75.000	30.000
2.0- 2.9	40.000	10.000	.000	.000	50.000	20.000
3.0- 3.9	25.000	.000	.000	.000	25.000	10.000
4.0- 4.9	20.000	.000	.000	.000	20.000	8.000
TOTAL	230.00	20.00	.00	.00	250.00	100.00
PERCENT	92.00	8.00	.00	.00	100.00	

AVERAGE DIAMETER FOR NON-HOST TREES

POND PINE	WHITE PINE		OTHER	TOTAL
1.9761	1.8250	.0000	.0000	1.9640